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(54) **MODULAR FIBER LOG EROSION AND SEDIMENT CONTROL BARRIER**

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(52) **U.S. Cl.** **405/302.6**; 405/15; 405/21; 405/32; 405/258.1; 405/302.7

(58) **Field of Search** .... 405/15–17, 19, 405/21, 22, 23, 26, 28, 32–34, 258.1; 47/65.5, 66.1, 66.3, 66.5–7, 59 R

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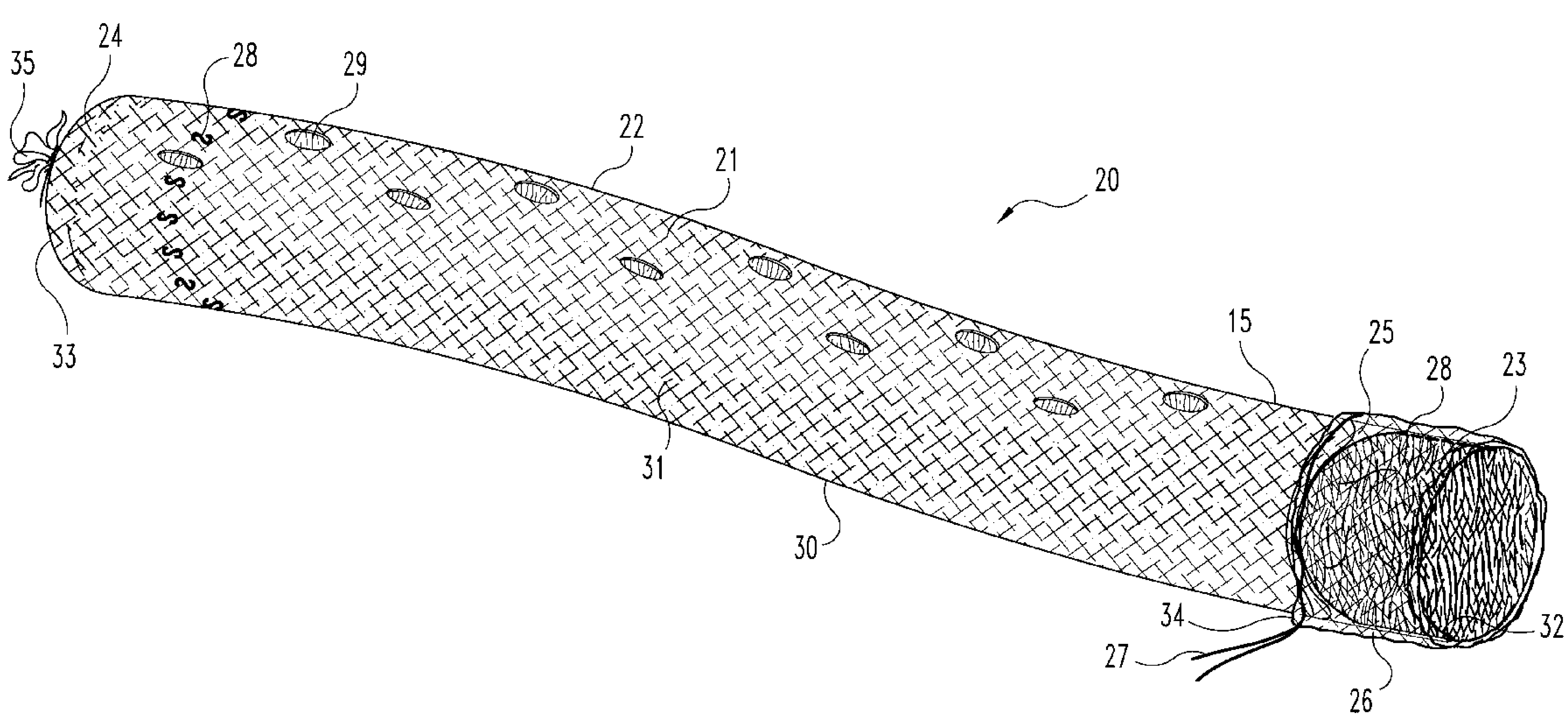
(57) **ABSTRACT**

A modular erosion and sediment control barrier. The linear modular erosion and sediment control barrier is constructed of fiber logs joined end-to-end. Each fiber log is made of a quantity of loose fibers retained in a tubular casing by a plug. The tubular casing includes an extended section which is peeled back and folds over the end of the coupler fiber log during storage and transportation. When deployed, the extended section is unfolded to receive the end of an adjacent fiber log. The two fiber logs are secured together by a cord and hooks.

24 Claims, 10 Drawing Sheets



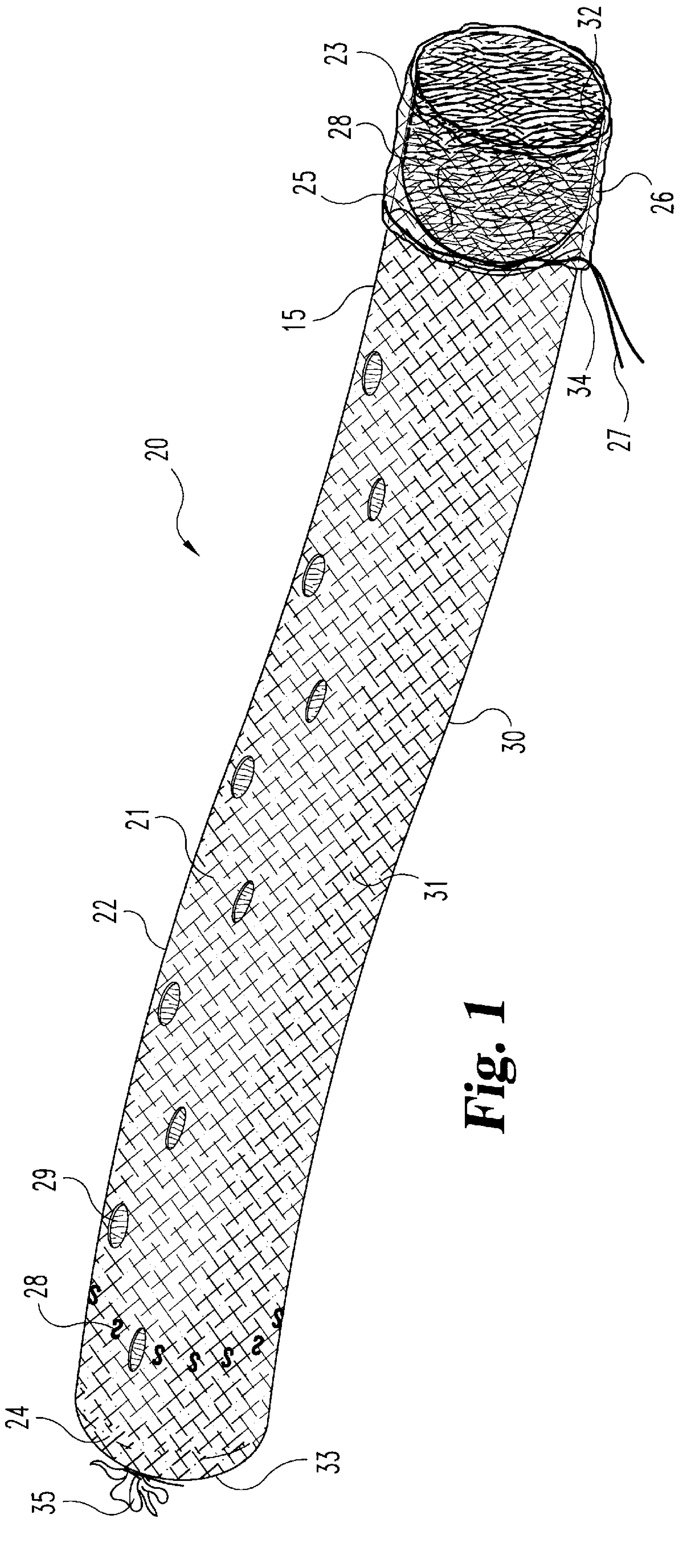


Fig. 1

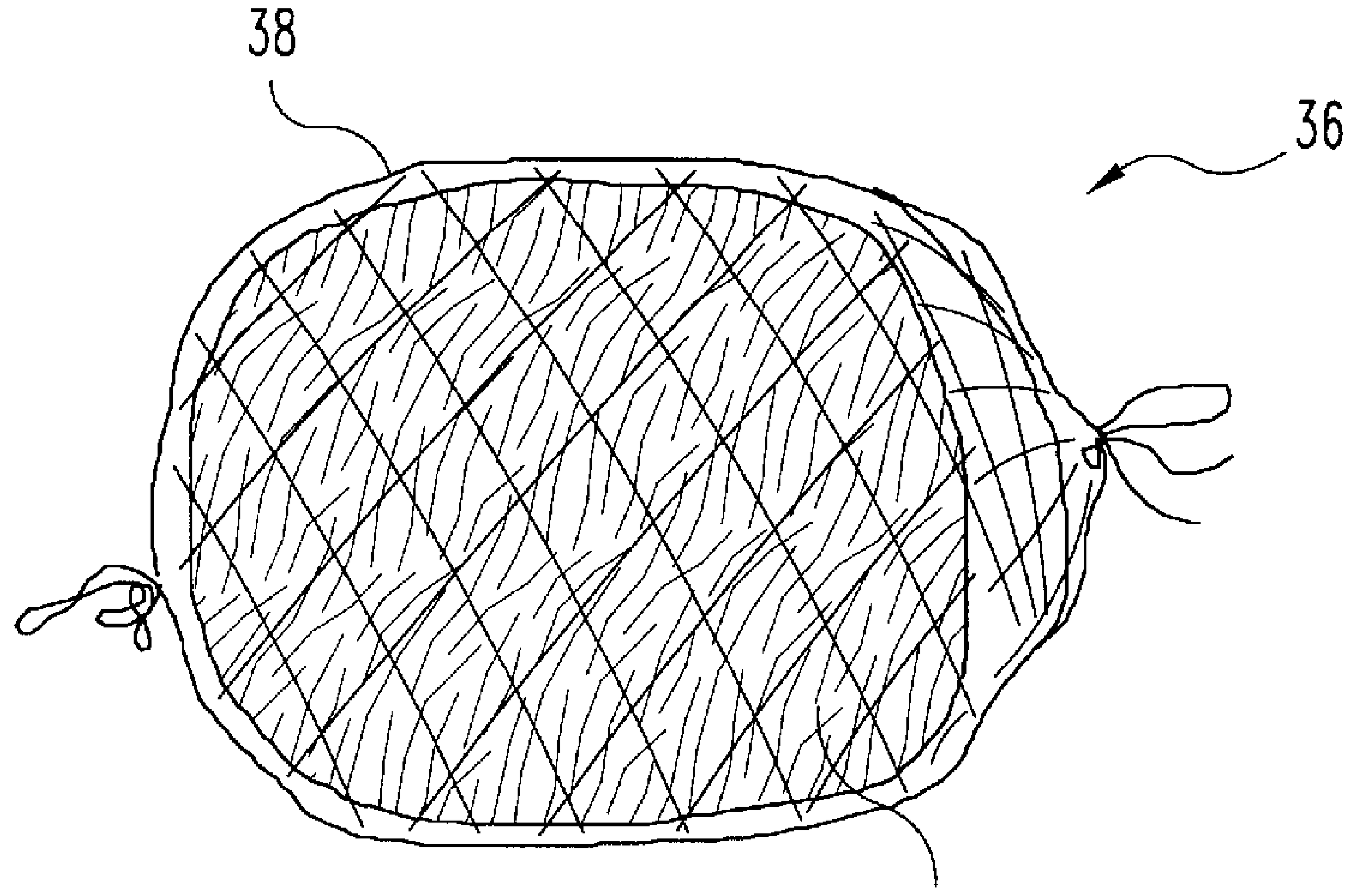


Fig. 2

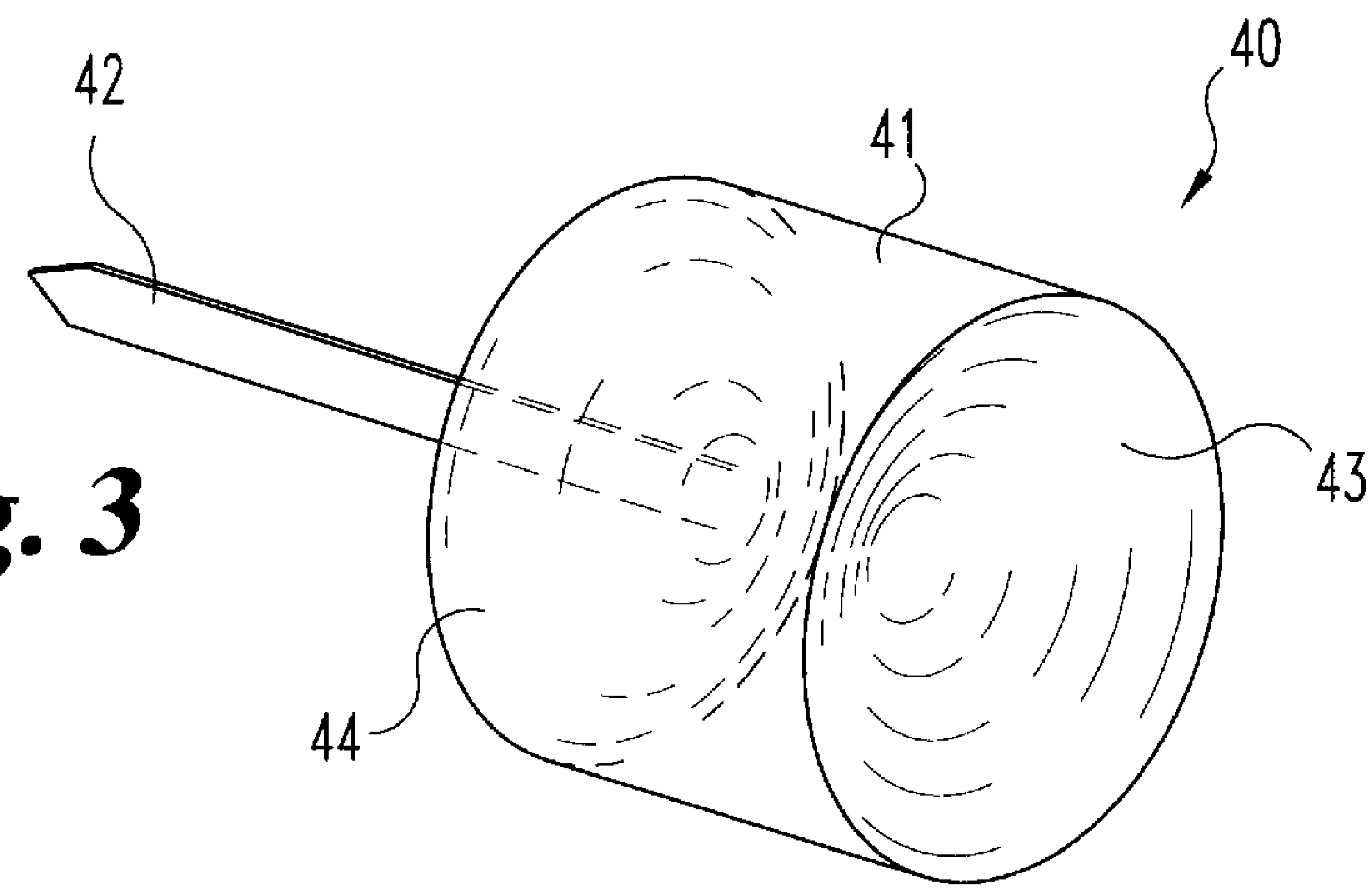


Fig. 3

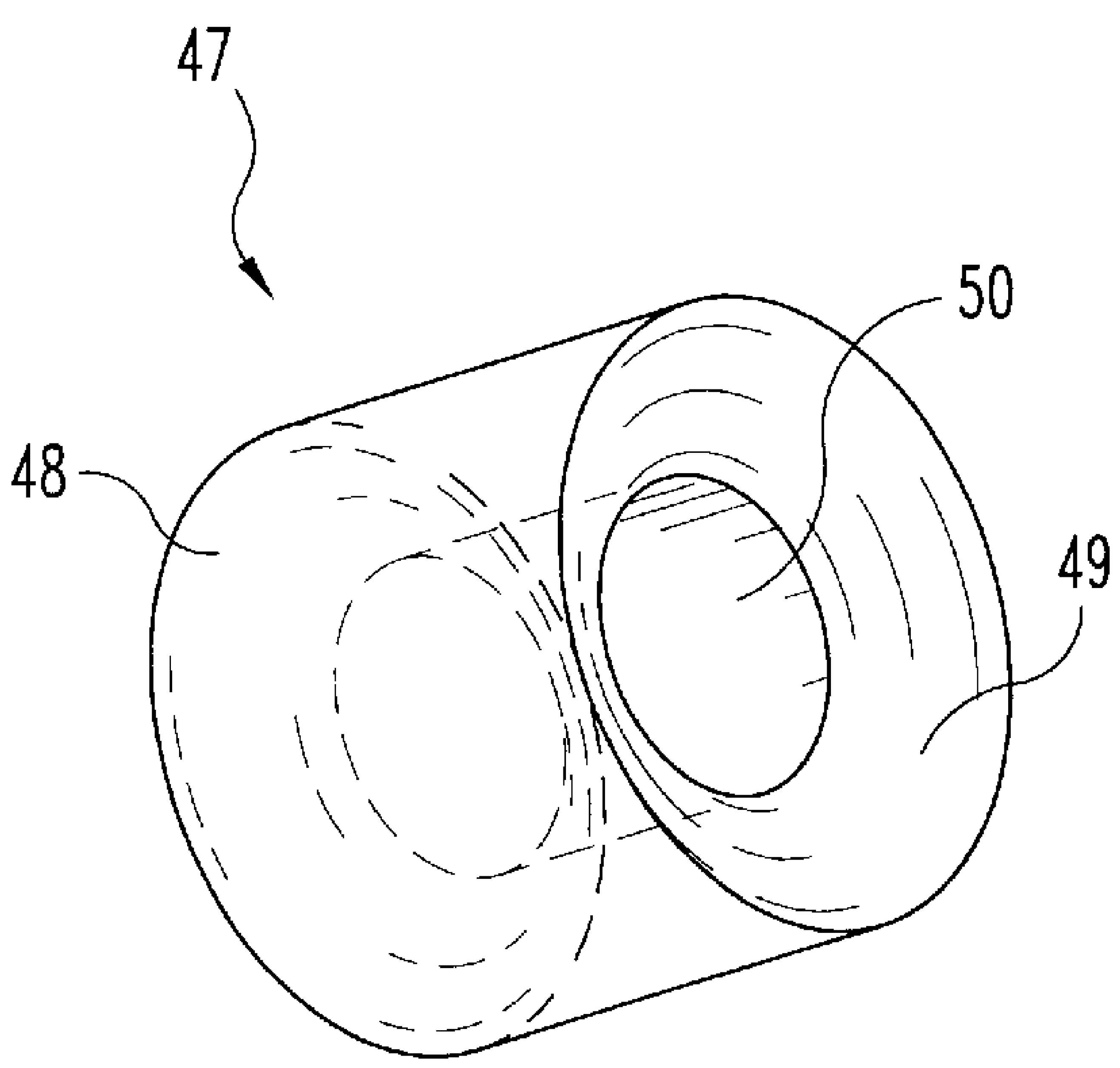


Fig. 4

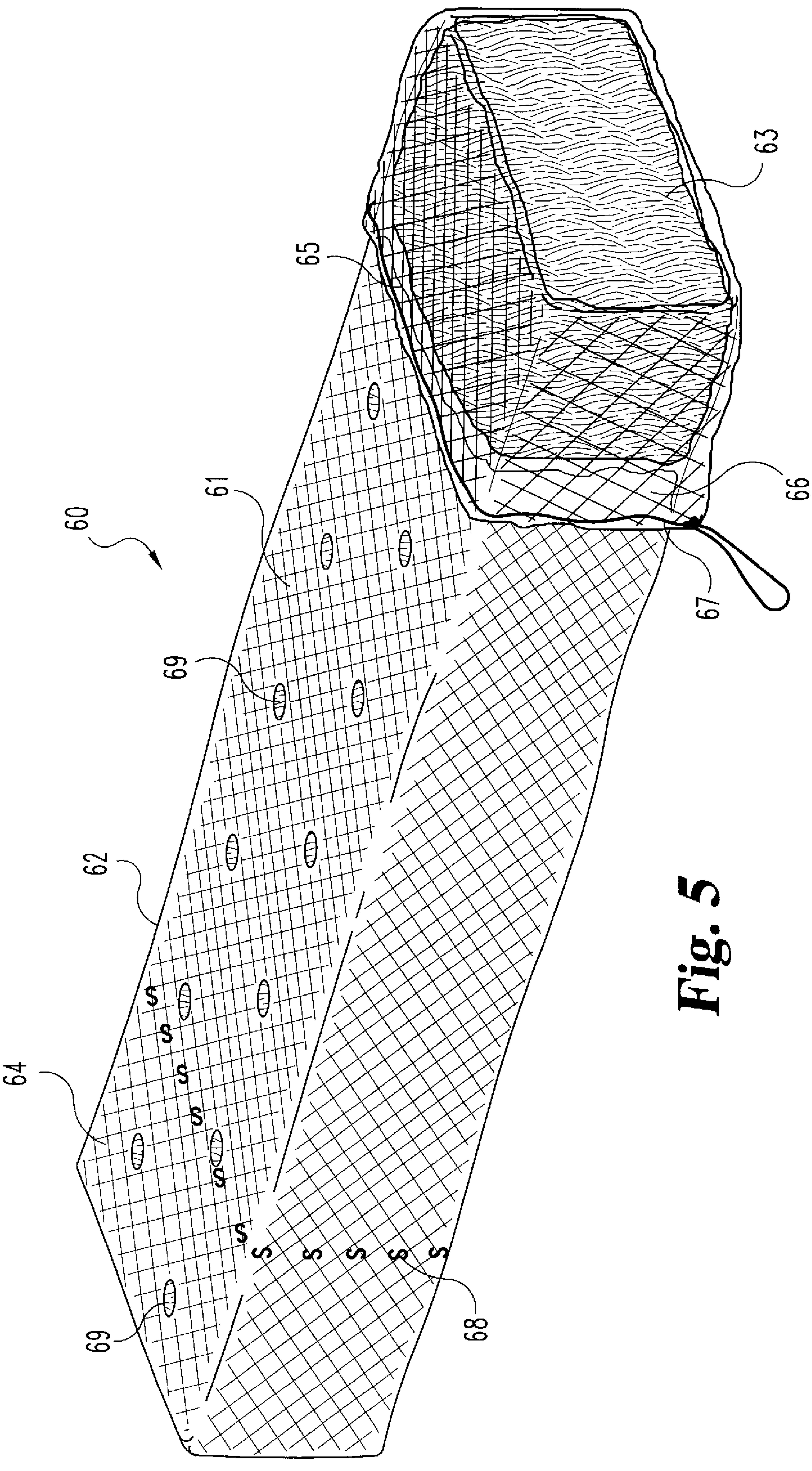


Fig. 5

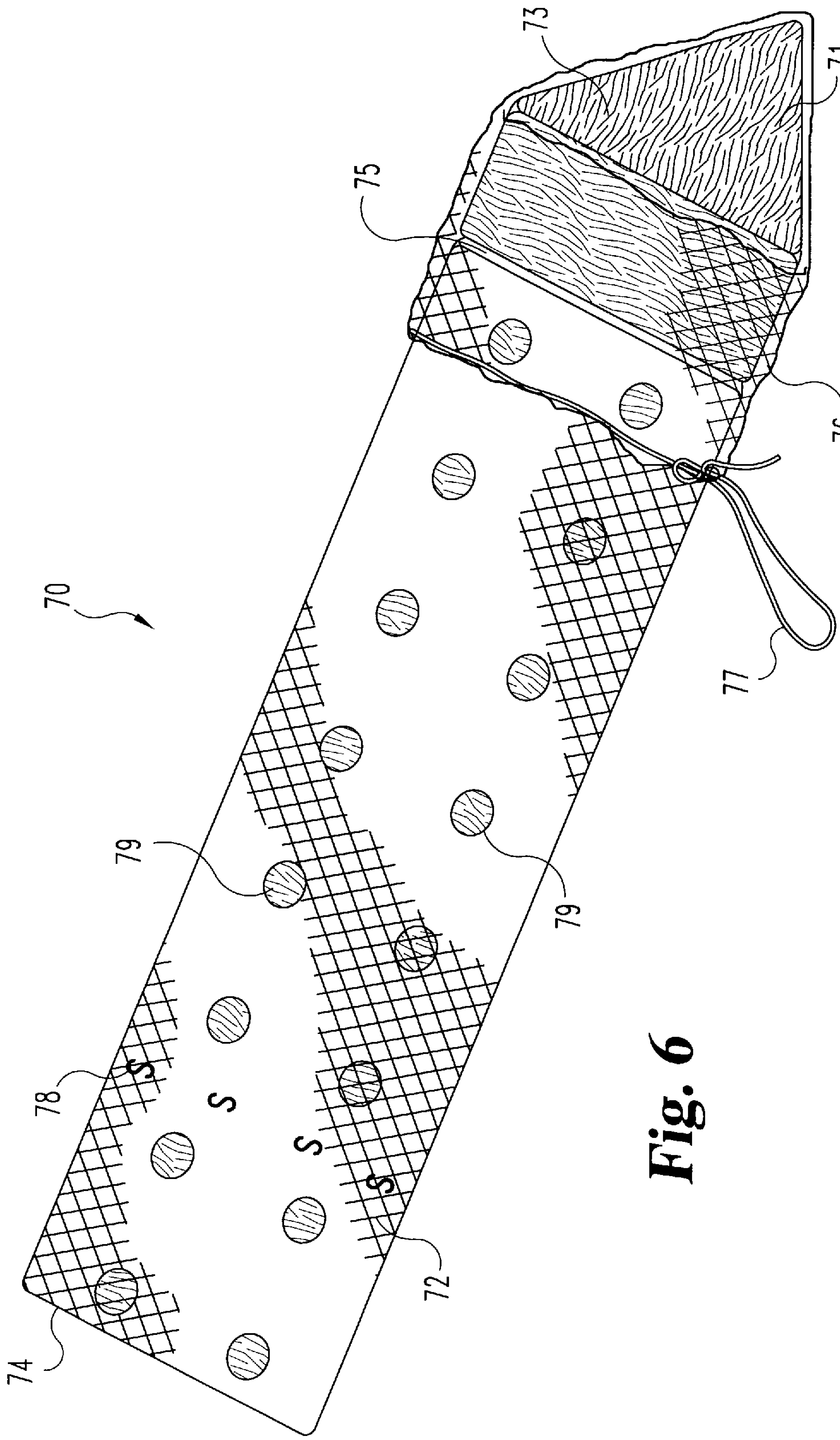


Fig. 6

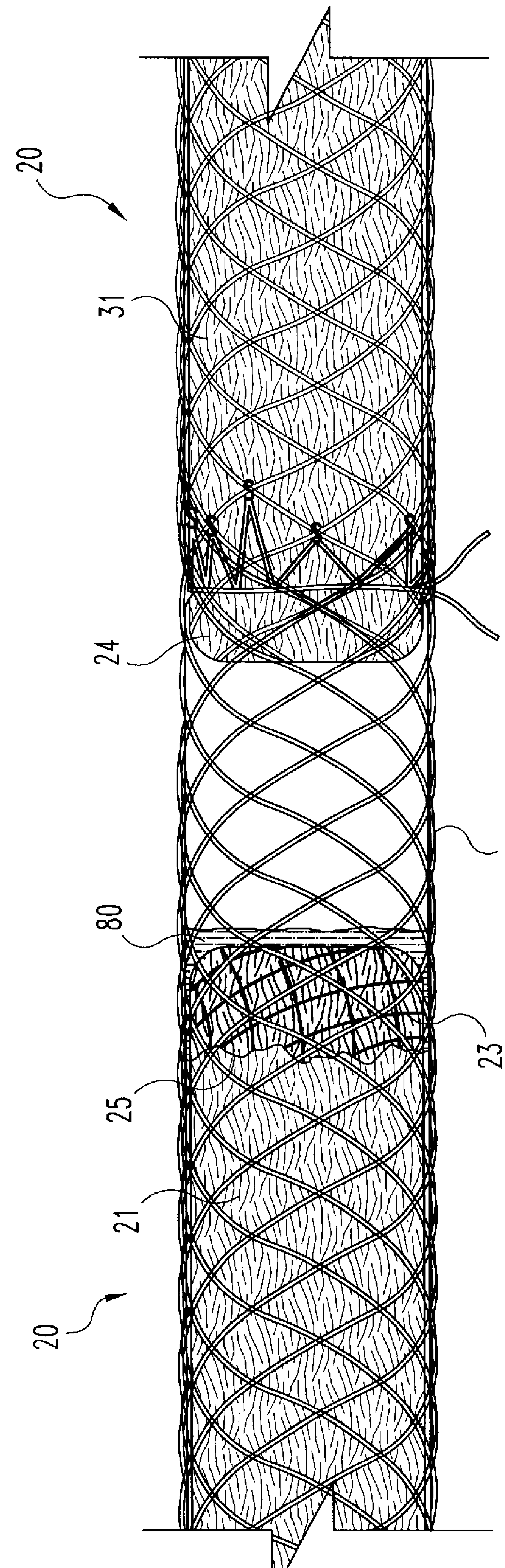


Fig. 7

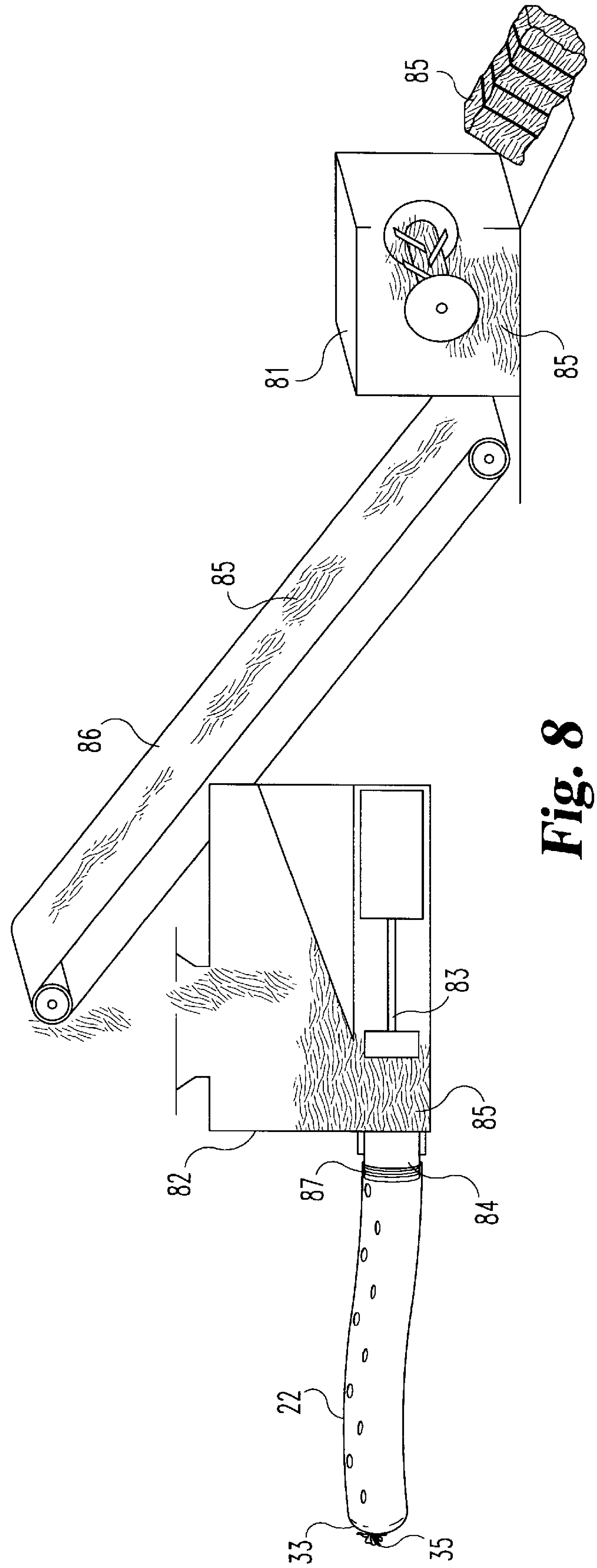


Fig. 8

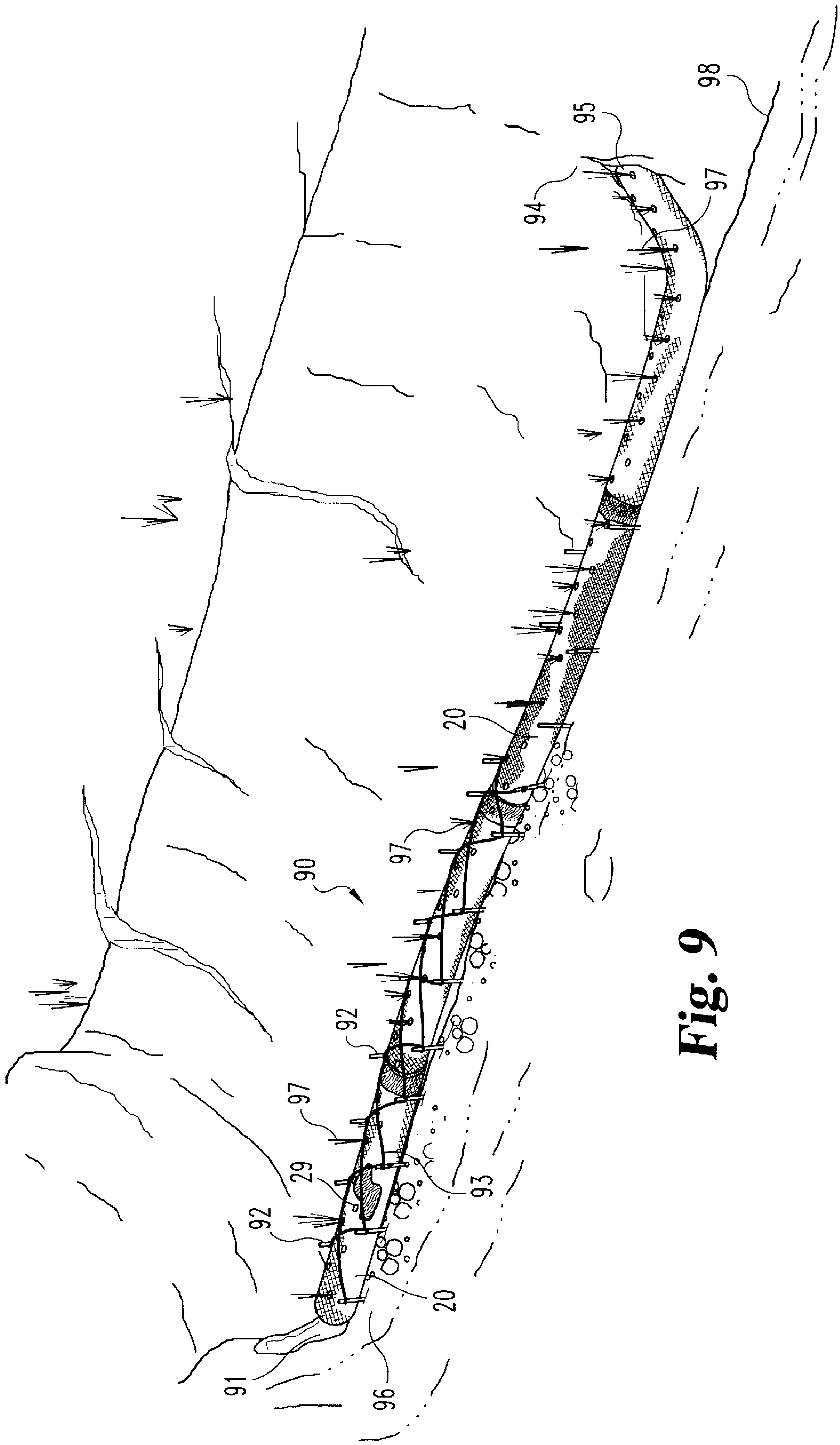


Fig. 9

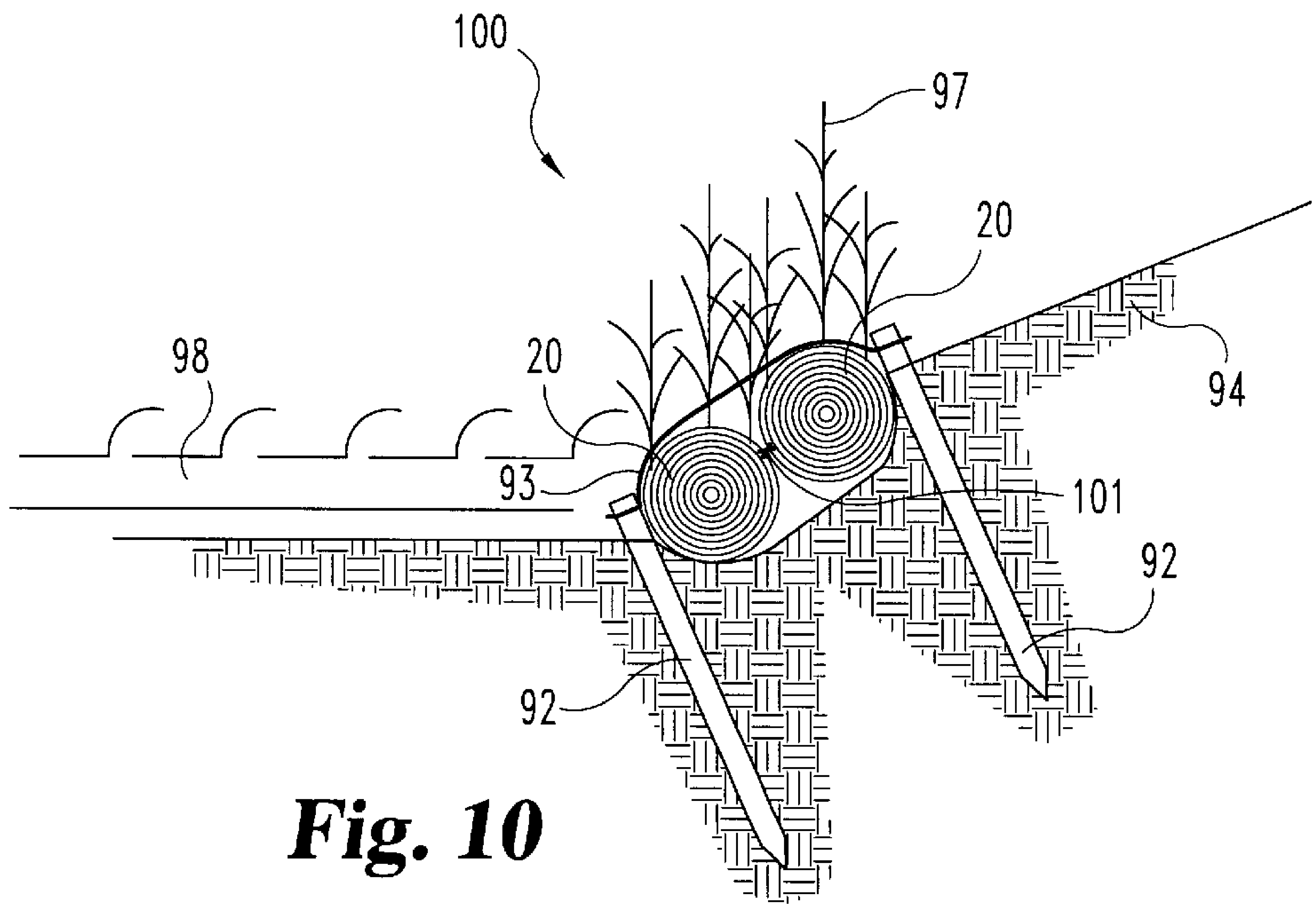


Fig. 10

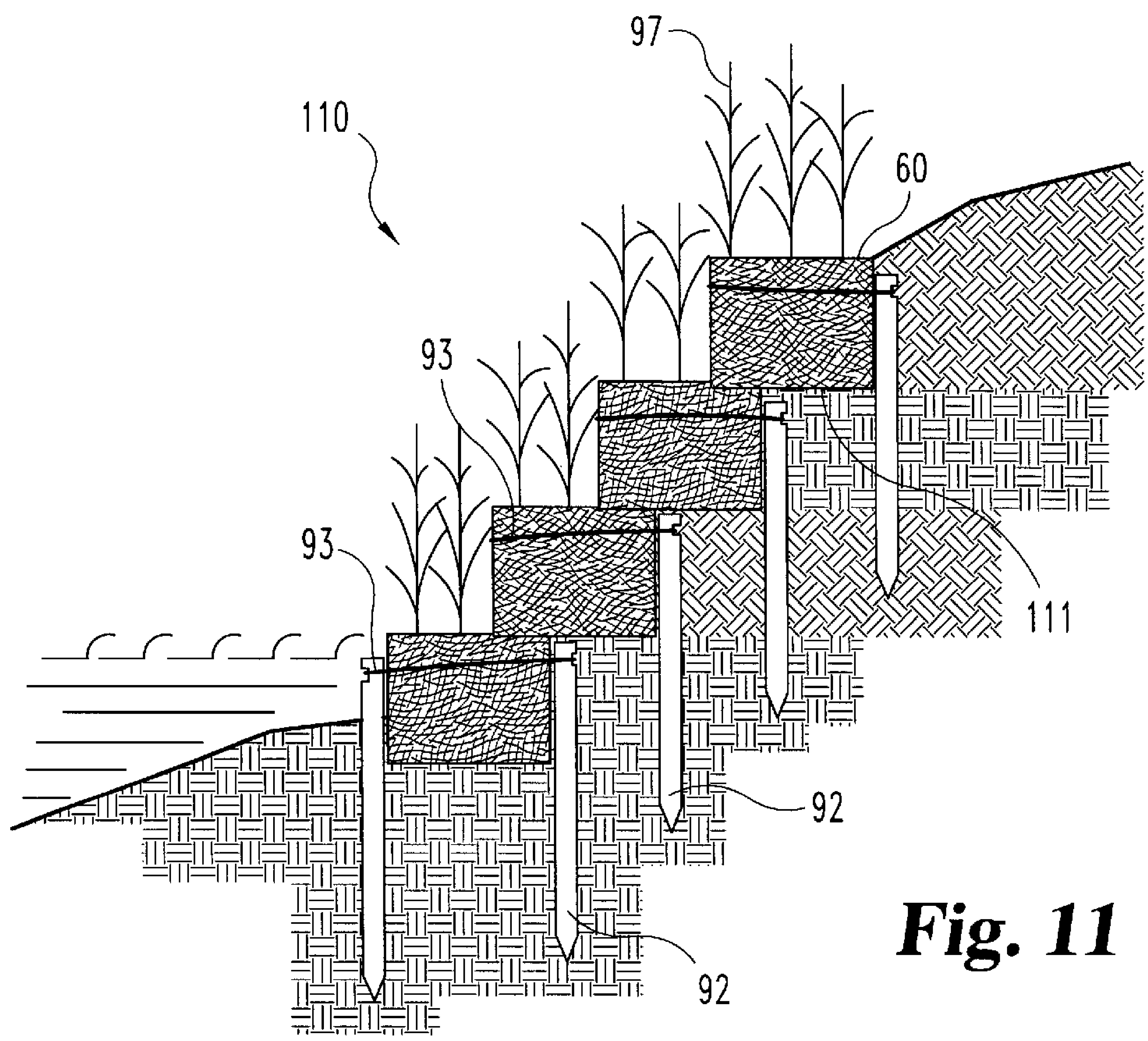


Fig. 11

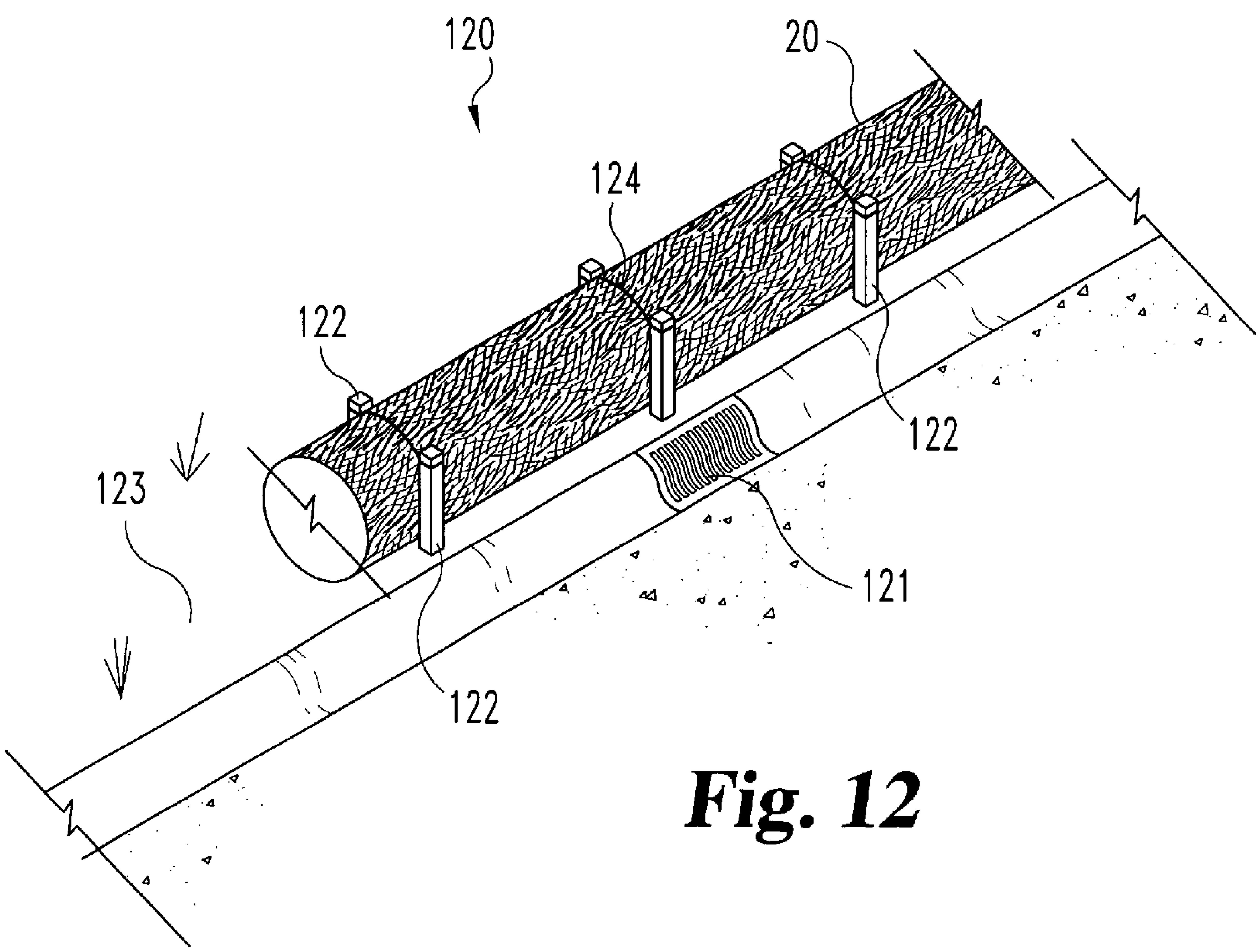


Fig. 12

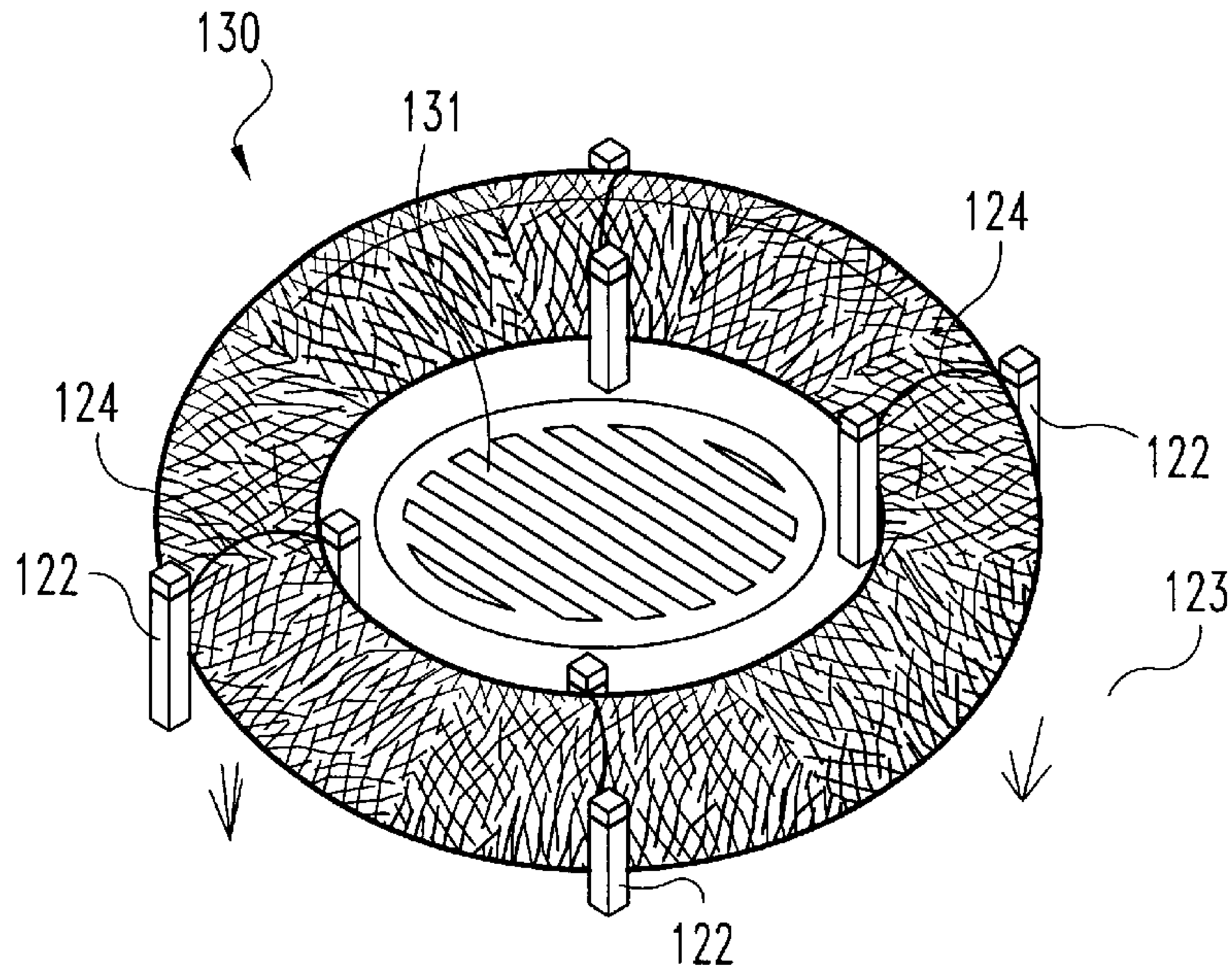


Fig. 13

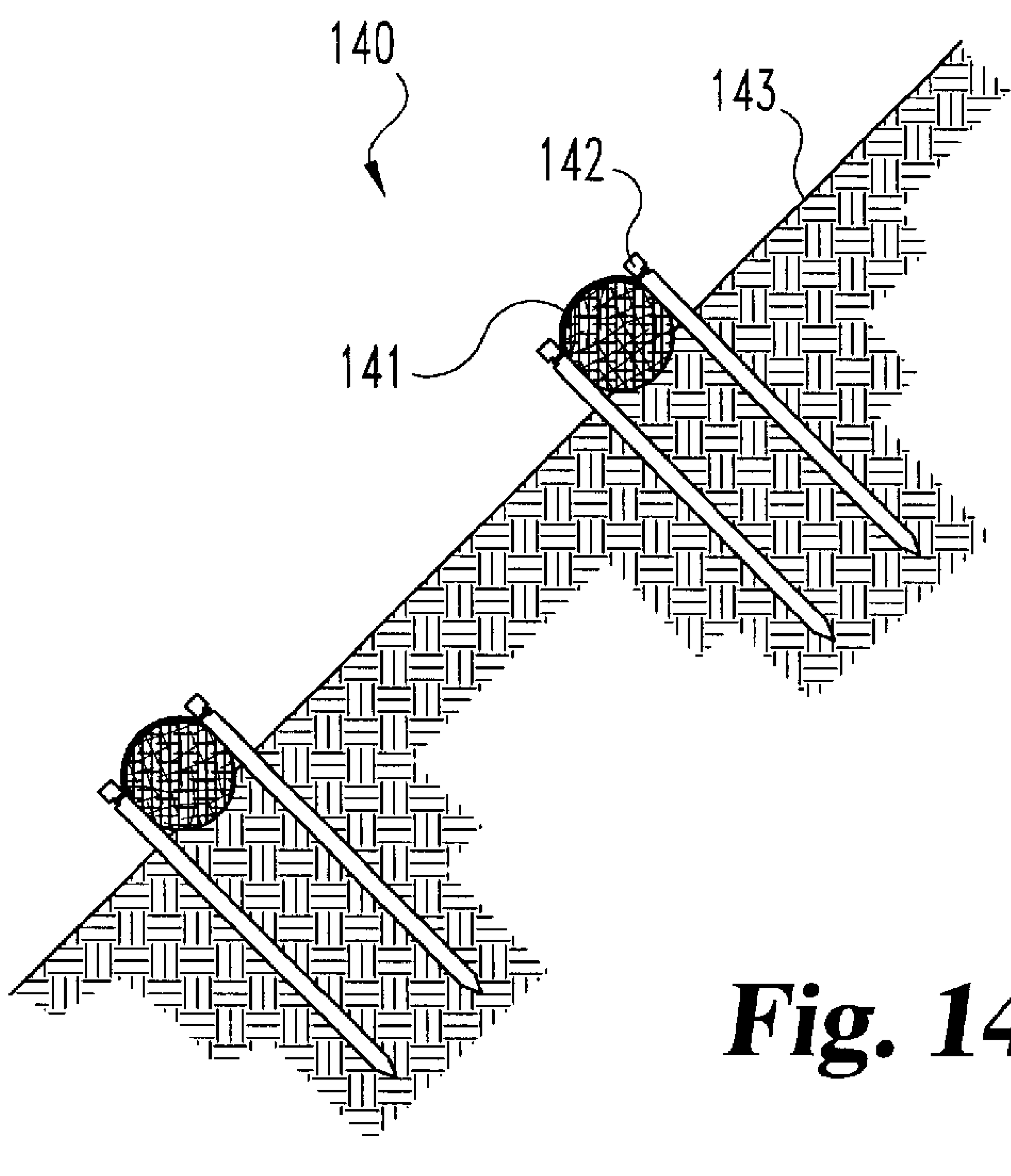


Fig. 14

MODULAR FIBER LOG EROSION AND SEDIMENT CONTROL BARRIER

The present invention generally relates to an erosion and sediment control barrier, and more specifically relates to a modular erosion and sediment control barrier composed of coupler fiber logs.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a circular coupler, a first embodiment of the coupler fiber logs of the present invention.

FIG. **2** is a perspective view of a fiber-ball plug, a first embodiment of the plugs of the present invention.

FIG. **3** is a perspective view of a pin plug, a second embodiment of the plugs of the present invention.

FIG. **4** is a perspective view of a disc plug, a third embodiment of the plugs of the present invention.

FIG. **5** is a perspective view of a rectangular coupler, a second embodiment of the coupler fiber logs of the present invention.

FIG. **6** is a perspective view of a triangular coupler, a third embodiment of the coupler fiber logs of the present invention.

FIG. **7** is a perspective view showing the joining of two adjacent circular coupler fiber logs.

FIG. **8** is a schematic view of the machinery suitable for the manufacturing of coupler fiber logs.

FIG. **9** is a perspective view of an embodiment of an erosion and sediment control barrier of the present invention installed at a water's edge.

FIG. **10** is a side sectional view of a two-tiered erosion and sediment control barrier of the present invention installed at a water's edge.

FIG. **11** is a side sectional view of a terraced erosion and sediment control barrier of the present invention, installed at a water's edge.

FIG. **12** is a perspective view of a linear silt trapper, an embodiment of the erosion and sediment control barriers of the present invention, installed in front of a curb inlet.

FIG. **13** is a perspective view of a ring silt trapper, an embodiment of the erosion and sediment control barriers of the present invention, installed around a storm inlet.

FIG. **14** is a side sectional view of a prairelog, an embodiment of the slope stabilizer of the present invention, installed on a steep slope.

DESCRIPTION OF A PREFERRED EMBODIMENT

For the purpose of promoting an understanding of the principles of the present invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. Any alterations and further modifications in the illustrated device, and any further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates are also included.

An aspect of the present invention is a coupler fiber log which can be used singly or in combination as an erosion and/or sediment barrier. The term "log", hereinafter, describes an elongated object having greater lengths than

cross-sectional widths. The coupler fiber log includes a quantity of fibrous filler held inside a casing, and further includes means to join an adjacent coupler fiber log in an end-to-end orientation. The coupler fiber logs can be formed to any shape and size to accommodate the needs of an application. Commonly, the coupler fiber logs have circular, rectangular or triangular cross sections. However, it is contemplated that the coupler fiber logs may be formed into any shape. In selected embodiments, plant wells or other means are provided to promote plant growth within the coupler fiber logs.

Referring now to the drawings wherein like reference numerals designate corresponding components throughout the several views. FIG. **1** shows a circular coupler fiber log or circular coupler **20**, a first embodiment of the coupler fiber log of the present invention. The term "circular", hereinafter, describes all planar shapes that are approximately round or partially round. Circular coupler **20** has a circular cross section and a length extends therefrom. Circular coupler fiber log **20** includes a pack of fibrous filler **21** held inside a casing **22** by a plug **23**. The pack of fibrous filler or filler pack **21** includes a first end **24** and a second end **25**. Casing **22** includes an extended section or net extension **26** which extends beyond plug **23** and has a cinch cord **27** weaving around its end. When circular coupler **20** is being stored or transported, net extension **26** peels over and folds around, the exterior of circular coupler **20**, proximal to second end **25**. On the exterior of circular coupler **20**, proximal to first end **24**, a plurality of S-hooks **28** are provided. Also on the exterior of circular coupler **20**, a series of plant wells **29** are provided.

Casing **22** holds the quantity of loose fiber forming the pack of fibrous filler or filler pack **21**. Preferably, casing **22** allows fluid communication between filler pack **21** and the outside environment. It is contemplated that casing **22** is constructed of a porous or perforated material, or is formed with an open weave. In this illustrated embodiment, casing **22** is formed as a tubular mesh netting **30**. Tubular mesh netting or net **30** has a length, grid-like openings **31** along its length, an interior chamber **32**, a closed end **33**, and an opened end **34**. The total length of net **30** is defined by the combined lengths of filler pack **21**, plug **23** and net extension **26**. Preferably, net extension **26** is approximately three quarter to one time (¾ to 1) the prescribed diameter of circular coupler fiber log **20**.

Grid-like openings **31** of net **30** provide the path for fluid communication between filler pack **21** retained inside casing **22** with the outside environment. Grid-like openings **31** vary in size and shape, but are generally rectangular and sufficiently small enabling the retention of the loose fibers of filler pack **21**. In one embodiment, one side of grid-like opening **31** measures less than about two and a half (2½) inches. In another embodiment, one side of grid-like opening **31** measures about one and a half (1½) inches.

Net **30** is constructed from a tubular netting material. Such tubular netting materials are commercially available in roll form. A predetermined length is cut from such a roll and tied at one end with a cord **35** forming net **30** with a length, an interior chamber **32**, a closed end **33** and an open end **34**. However, it is contemplated that net **30** may be constructed individually and has an integrally formed closed end **33**. The methods of constructing a tubular netting material are well known in the art. The tubular netting material may be formed by knotting at grid intersections to define the grid openings or formed by inter-braiding together strands of ropes or twines at the intersection of the openings, so that the openings are formed free of knots. It is understood that other methods of forming an open weave net may be used.

It is preferred that net **30** is constructed of a durable material, either natural or synthetic fibers, which can withstand the abrasive forces of the application site environments. In the illustrated embodiment, net **30** is constructed of extruded strands of polypropylene fibers. However, other synthetic materials, e.g., polypropylene and nylon, having adequate strength and durability may also be used. Cord **35**, used for tying close net **30**, may be made of any material, but are generally made of synthetic polymers like nylon and polypropylene. In applications where natural fibers are preferred, net **30** may be constructed from ropes or twine made of natural fibers such as jute, hemp, sisal, or coir. For such a natural application, cord **35** would made of a natural fiber, e.g., jute, sisal, hemp and coir.

The loose fibers used to pack circular coupler **20** are generally slow decaying natural fibers. Coir fiber being one of the slowest decaying natural fibers is a preferred choice of filler material. Coir fibers are graded by the length of the fibers, and are commercially available in bristle (long), mattress (medium) and omat (short) grades. Mattress grade coir fibers are preferably used. It is understood, however, that the other grades of coir fibers may also be used. It is further understood that other slow decaying natural or synthetic fibers may also be used without deviating from the scope and spirit of the present invention.

Plug **23** is provided for blocking open end **34** of casing **22** and for bridging the gap between the ends of two joined coupler fiber logs. FIG. **2** shows a first embodiment of plug **23**, namely, a fiber-ball plug **36**. Fiber-ball plug **36** is a ball of fibrous filler **37** held inside a net **38**. Preferably, the same fibrous filler and casing material used to form circular coupler **20** are used to construct fiber ball plug **36**. Fiber-ball plug **36** is packed to a sufficient stiffness adequate to prevent the loose fibers of filler pack **21** from escaping out of open end **34**.

FIG. **3** shows a second embodiment of plug **23**, namely a pin plug **40**. Pin plug **40** includes a disk portion **41** and a stem portion **42**. Disk portion **41** adapts to prevent passage block of the filler pack **21**, and includes a diameter similar to that of circular coupler **20** for which pin plug **40** is intended to be placed, and a thickness between approximately 3 to 5 inches. Disk portion **41** further includes outside surface **43** and inside surface **44**. Both surfaces **43** and **44** are preferably concave. When installed, outside surface **43** orients towards open end **34** of casing **22** while inside surface **44** faces filler pack **21**. Stem portion **42** extends from second surface **44** of disk portion **41**. Stem portion **42** adapted to anchor into fibrous filler pack **21** is cylindrical. Preferably, pin plug **40** is made of a material which has similar aging characteristics as filler pack **21**. In one embodiment, pin plug **40** is made from a slow decaying wood. In another embodiment, pin plug **40** is made of fibers which are bonded together with latex.

FIG. **4** depicts a third embodiment of plug **23**, particularly identified as disc plug **47**. Disc plug **47** is shaped like a donut and having a diameter, a thickness, an inside face **48** and an outside face **49** and a hole **50**, extending between faces **48** and **49**. The diameter of disc plug **47** is approximately the same as that of circular coupler **20** in which disc plug **47** is intended to be placed and the thickness is approximately 3 to 5 inches. Both faces **48** and **49** of disc plug **47** are preferably concave adapted to complement the shape of the ends of circular couple fiber logs **20**. When installed, inside face **48** orients toward filler pack **21**, while outside face **49** orients towards open end **34** of casing **22**. Hole **50** is provided to enhance fluid communication and extends between inside face **48** and outside face **49**. While a single hole is included in the illustrated embodiment, other configurations of perforations may be included instead. Preferably, disc plug **47** is made of a material that is flexible and compressible. In one embodiment, disc plug **47** is formed of latex. In the illustrated embodiment, disc plug **47** is made of latex bonded fibers. The adequate amount of fiber included is adequate to increase the stiffness of disc plug **47**, but not to compromise its compressibility and flexibility. Preferably, the fiber dispersed in the latex is the same fiber used to pack circular coupler fiber logs **20**. However, any non-reacting fibers may be used.

S-hooks **28** are provided to couple two adjacent circular couplers **20** together, and are attached to the exterior of net **30** proximal to first end **24** of circular coupler **20**. S-hooks **28** may be of any dimension which are capable of joining the cinch cord **27** of a first circular coupler **20** to net **30** of an adjacent circular coupler **20**. In the illustrated embodiment, S-hooks **28** are approximately one inch in length. In addition, S-hooks **28** are preferably made of stainless steel. However, materials which have the requisite strength and resistance to the environmental agents may also be used.

Cinch cord **27** weaves around open end **34** of casing **22** and is for joining two adjacent circular couplers **20**. Cinch cord **27** is formed of a durable material, for example, nylon or polypropylene. In the illustrated example, the cinch cord **27** is formed of nylon. In addition, cinch cord **27** may be of any diameter having the strength of holding two circular couplers **20** together. In one embodiment, for coupling two 16-inch diameter circular couplers **20**, cinch cord **27** is 0.125 inch in diameter.

Plant wells **29** are cavities formed into the sides of circular coupler fiber logs **20** and are cut adequately deep for the placement of seeds or seedlings and plant growth medium. In the illustrated embodiment, plant wells **29** are approximately 2 inches in diameter and 4 inches deep. Plant wells **29** are placed in two rows at the top surface along the length of circular coupler **20**. The two rows are placed, when viewing from a cross section of circular coupler **20**, at approximately the 2 o'clock and 10 o'clock positions. In addition, consecutive plant wells **29**, measuring along the length of circular coupler **20**, are about six inches apart.

In general, plant wells are provided in coupler fiber logs which are intended for permanent placement and at site where water is available. It is contemplated that, with the right encouragement, vegetation/plants grow through the coupler fiber logs and their roots anchor into the underlying sediment/soil. It is further contemplated that the anchoring plant roots hold the underlying soil in place, thus, providing added stabilization against further erosion. While plant wells **29** are contemplated as a means to promote plant growth, other plant growth promoting methods are also contemplated. In one embodiment of the present invention, the coupler fiber logs are incorporated with plant seeds and a quantity of plant growth promoting medium (plant food or fertilizer). It is contemplated that under favorable conditions, the incorporated seeds germinate and the plant growth promoting medium provide the necessary nutrient for the roots of the newly germinated plants to grow through the coupler fiber logs and anchor into the underlying sediment/soil. It is further contemplated to start germination of the incorporated seeds prior to delivery of coupler fiber logs to the final installation site, thusly shortening the time required for plants to take root in the underlying sediment/soil.

Circular couplers **20** can be packed to any length prescribed by an application. For weight and maneuverability considerations, circular couplers **20** are generally packed to less than 20 feet in length. In one embodiment, circular couplers **20** are packed to approximately 7-½ feet long. This length allows circular couplers **20** to fit on a conventional pallet for transporting on a conventional semi-trailer. Similarly, circular couplers **20** can be packed to any diameter suitable for specific applications. In the various embodiments of the present invention, circular couplers **20** are packed to approximately 6, 8, 12, 16, and 20 inches in diameter.

Circular couplers **20** can be packed to a range of fiber densities to suit the demand of the application sites. Generally, a denser coupler fiber log is desirable at locations where the area soils are subjected to greater erosive forces, and at locations where greater longevity and durability are required. A lighter coupler fiber log is adequate for areas where the soils are subjected to lesser erosion forces, and at locations where longevity and durability are a lesser issue. In one embodiment, for use as an erosion and sediment control barrier along the bank of a swift river, circular coupler fiber logs **20** are packed to a packing density of nine (9) pounds per cubic foot. In another embodiment, for use in the wetlands of a quiet river channel, circular coupler fiber logs **20** are packed to a packing density of five (5) pounds per cubic foot.

FIG. **5** shows a rectangular coupler fiber log or rectangular coupler **60**, a second embodiment of the coupler fiber log of the present invention. The term "rectangular", hereinafter, describes all four-sided polygonal shapes. These shapes range from a true square to a quadrilateral having four unequal sides and four unequal angles. Rectangular couplers **60** have the added advantage that they are easily stacked to form a terrace or a retaining wall.

Rectangular coupler fiber log **60** shares many features of circular coupler **20** which have been described previously. Rectangular coupler **60** has a rectangular cross section and a length extends therefrom. While a cross sectional shape close to a true rectangle is preferred, any four-sided polygonal shapes are within the scope of the present invention. Rectangular coupler fiber log **60** includes a pack of fibrous filler **61** held inside a casing **62** by a plug **63**. Rectangular coupler fiber log **60** further includes a first end **64** and a second end **65**. Casing **62** is similarly constructed as casing **22** of circular coupler **20**. Casting **62** also includes an extended section or net extension **66** which extends beyond plug **63**, and having a cinch cord **67** weaves around its end. During storage and transportation, net extension **66** peels over and folds around second end **65**. Plug **63** is shaped to compliment the cross section of rectangular coupler **60**, but is otherwise constructed similar to plug **23** of circular coupler fiber log **20**. On the exterior of rectangular coupler **60**, proximal to first end **64**, a plurality of S-hooks **68** are provided. Also on the exterior of circular coupler **60**, series of plant wells **69** are provided. Plant wells **69** are also similarly form as plant wells **29** of circular coupler **20**.

FIG. **6** shows a triangular coupler fiber log or triangular coupler **70**, a third embodiment of the coupler fiber log of the present invention. The term "triangular", hereinafter, describes all the shapes of a three-sided polygon. Generally, triangular coupler **70** is more stable against movement because of its wider base relative to its mass. It is contemplated that triangular coupler **70** has applications as erosion and sediment barrier on steep slopes.

Triangular coupler **70** shares many of the features of circular coupler **20** which have been described previously. Triangular coupler **70** has a triangular cross section and a length extends therefrom and includes a pack of fibrous filler **71** held inside a casing **72** by a plug **73**. The pack of fibrous filler or filler pack **71** includes a first end **74** and a second end **75**. Casing **72** is similarly constructed as casing **22** of circular coupler **20**. Casing **72** includes an extended section or net extension **76** which extends beyond plug **73** and having a cinch cord **77** weaves around its end. During storage and transportation, net extension **76** peels over and folds around second end **75**. Plug **73** is shaped to compliment the cross section of triangular coupler fiber log **70**, and otherwise is constructed similar to plug **23** of circular coupler fiber log **20**. On the exterior of triangular coupler **70**, proximal to first end **74**, a plurality of S-hooks **78** are provided. Also on the exterior of triangular coupler **70**, series of plant wells **79** are provided. Plant wells **79** are similar to plant wells **29** of circular coupler **20**.

The coupler fiber logs are preferably stored and transported as individual units, uncoupled. After delivery to the installation site, the individual coupler fiber logs are joined or connected end-to-end to produce an linear erosion and sediment control barrier. FIG. **7** depicts the method of joining two circular coupler fiber logs **20**. While circular couplers **20** are used in the illustration, it is understood that rectangular couplers **60** and triangular couplers **70** are similarly coupled to form linear erosion and sediment control barriers. As shown in FIG. **7**, the two circular coupler **20** to be joined are brought together in an end to end orientation having second end **25** of the first circular coupler **20** (at the left hand side) facing first end **24** of the second circular coupler **20** (at the right hand side). The net extension **26** of the first circular couple **20** is unfolded from its storage position and is extending out. A quantity of loose fiber **80** is first packed around plug **23** to fill the gaps between the shoulder of plug **23** and net extension **26**. First end **24** of the second circular coupler **20** is then received inside net extension **26** of the first circular coupler. Cinch cord **27** of the first circular coupler **20** is hooked onto the plurality of S-hooks placed around first end **24** of the second circular coupler **20**. The second circular coupler **20** is then pulled towards the first circular coupler **20**, by pulling on cinch cord **27** until the second circular coupler **20** engages loose fibers **80** and plug **23**. Thusly situated, net extension **26** of the first circular coupler **20** overlaps casing **22** of the second circular coupler **20**. Cinch cord **27** is pulled taut and the ends of cinch cord **27** secured. The two adjacent circular couplers **20** are thus joined together, preferably with end **24** butted against loose fiber **80** and/or end **25**. After securing the first two circular couplers **20** together, the procedure may be repeated to add a third and a fourth, etc. circular couplers **20** until a erosion and sediment control barrier of a desirable length is formed.

While the above method of securing the coupler fiber logs together are particularly illustrated, those of ordinary skill in this art should appreciate that one may use many conventional methods to join together the net extension of one coupler fiber log to the body of the second coupler fiber log. For example, one could use lacing, staples, wire, plastic ties, like those that are commonly used to hold electrical wires together, adhesive, adhesive tape, non-adhesive tape, stove clamps like those to connect a household clothes dryer to ductwork, a belt tied around the over-lapping casings, cable laced through or tied around the over-lapping casings, or any other method commonly known to be used to join or mend netting or join tubular structures end-to-end.

Coupler fiber logs of different dimensions and shapes may be manufactured by conventional machinery that generally includes a tiller **81**, a hopper **82**, a pusher **83**, and a stent tube

84. The differently shaped coupler fiber logs are constructed through the use of the appropriate shaped pushers **83** and stent tubes **84**. Referring now to FIG. **8** which shows a schematic drawing for the manufacturing of a circular coupler **20**. Circular coupler **20** is formed by packing a quantity of loose coir fibers **85** into a casing **20**. Coir fibers **85** can be purchased commercially in bales of approximately 360 pounds each. Generally, the baled fibers have not been pre-processed and much of their natural layering remains. So being, the inventors have found that a more consistent circular coupler **20** can be produced by first fluffing the coir fibers **85**. Thus, after un-baling, the coir fibers **85** are placed in tiller **81** where the fibers are disrupted and separated. The fluffed-up coir fibers **85** are then delivered to hopper **82** via a conveyer belt **86**. A cylindrical pusher **83**, slides back and forth horizontally immediately below hopper **82** and pushes loose coir fibers **85** through a cylindrical stent tube **84** and into an awaiting casing **22**. Casing **22** is wrapped around and frictionally held to the outside of stent tube **84** by a chain belt **87**. Initially, casing **22** is positioned such that closed end **33** of casing **22** abuts the exit of stent tube **84**. As the coir fibers **85** are fed into casing **22**, closed end **33** slides outward and causes the release of unfilled sections of casing **22** underneath chain belt **87**.

The rate of release of casing **22** determines the packing density of circular coupler fiber log **20**; the slower casing **22** is released, the higher the packing density of the resultant coupler fiber log **20**. The frictional force applied by belt **87** onto casing **22** as casing **22** resides over stent tube **84** controls the rate of release of casing **22**. The amount of applied frictional force to effect a release rate is empirically determined. After a prescribed length of circular coupler fiber log **20** is reached, filler pack **21** formed by loose coir fibers **85** is capped with plug **23**. Casing **22** is then released from stent tube **83**, and net extension **26** is peeled over and fold around the newly formed circular coupler fiber log **20**.

The coupler fiber logs of the present invention have multiple applications as erosion and sediment control barriers, e.g., for buffing of flow and wave forces, sediment capture, re-vegetation and erosion control. The coupler fiber logs can be deployed singly or in combination with other coupler fiber logs, and be arranged in various configurations to suit the application and to accommodate the installation site environment.

FIG. **9** show an erosion and sediment control barrier **90** formed by circular couplers **20** installed at a shoreline. While circular couplers **20** are used for this illustration, it is understood that other shaped coupler fiber logs may also be used. Erosion and sediment control barrier or barrier **90** dissipates and reduces the effect of the erosive forces produced by wave action and flowing water. Barrier **90** may be placed below, at or above the water's edge. Commonly, the erosion and sediment control barrier **90** is placed where the water extends up to about two-thirds the height of barrier **90**.

As illustrated, barrier **90** includes a plurality of circular couplers **20** coupled together and set into a shallow trench **91** and held by stakes **92** and ropes **93** that are wound between stakes **92** and over circular couplers **20**. Erosion control barrier **90** is generally assembled in situ by methods previously described. The dimension of trench **91** necessary for the placement of barrier **90** depends on the site geometry. In one embodiment for setting a barrier **90** composed of a 16-inch diameter circular couplers **20**, trench **91** is 4 inches deep and 10.5 inches wide. Anchor stakes **92** are typically placed in the front and in the back of barrier **90** at user-prescribed distances, usually about 1 to 2 feet apart on each side of barrier **90**. Stakes **92** preferably are made of hard wood, have about a 2 inches by 2 inches cross-section, are approximately 36 inches long, and are preferably notched at their upper end to receive rope **93**. With stakes **92** implanted in the sediment/soil **94**, ropes **93** are lashed to stakes **92** in a front-and-back rotation, similar to the process of lacing your shoes. For further security, the ends **95** of barrier **90** may be buried into the existing bank. Thusly secured, the land ward side behind barrier **90** is preferably back filled to ground level. In addition, rock rip rap **96** or rock retainer basket may be placed on the water side in front of barrier **90** for added security.

While it is convenient and expedient to use stakes **92** and ropes **93** to secure barrier **90** to ground **94**, other securing methods may also be used. Barrier **90** may also be secured with rock, geotextiles, geogrid, earth anchors, and the likes according to the site conditions. While methods for placing and anchoring barrier **90** have been suggested, it is understood that the placement and anchoring of an erosion and sediment control barrier is site dependent and is well known to a person of ordinary skill in the art. For the convenience of the reader, however, additional details of the use and installation of coupler fiber logs can be found in U.S. Pat. Nos. 5,338,131; 5,425,597; 5,641,244; and 5,678,954 to Bestman, as well as, U.S. Pat. No. 5,951,202 to Brown, the disclosures of which are all specifically incorporated into this specification by reference.

In addition to relying on the physical mass of barrier **90** to control erosion, the illustrated embodiment contemplates using vegetation or plants **97** to stabilize the surface layer of sediment/soil **94**. The circular couplers **20** forming barrier **90** are provided with plant wells **29**. It is contemplated that the roots of plants **97** which grow down through plant wells **29** to the underlying soil and hold the underlying soil in place.

While only one linear erosion barrier **90** is shown installed in FIG. **9**, it is understood that multiple linear erosion control barriers **90** may be installed in parallel or in other configurations where situation demands. FIG. **10** shows a two-tiered barrier **100** having two rows of joined circular coupler **20** installed along the water edge **98**. The two rows of joined circular couplers **20** are placed parallel to each other and secured by lacing **101**. The two-tiered barrier **100** is anchored to the soil/sediment **94** with stakes **92** and rope **93** as described for barrier **90** above. The circular coupler **20** composing two-tiered barrier **100** are provided with plant wells to promote the growing of plants **97** through circular couplers **20**.

FIG. **11** shows a erosion and sediment control terrace **110** which provides protection to shorelines. Terrace **110** includes multiple rows of rectangular couplers **60** stacked on each other and on a precut sub-grade soil terrace **111**. Rectangular couplers are held by stakes **92** anchored into the soil terrace **111** and are further held by ropes **93** which wind around rectangular couplers **90** and tie to stakes **92**. In addition to relying on the physical mass of rectangular coupler **60** to control erosion, the illustrated embodiment further contemplates the use of vegetation or plants **97** to stabilize the underlying soil.

The coupler fiber logs may also be used to entrap and capture sediment and is useful in many locations and situations where a sediment barrier needs to be constructed quickly. FIG. **12** shows a linear silt-trapper **120** placed in front of a curb side inlet **121**. Silt-trapper **120** allows water to seep through and drain to inlet **121** but traps the silt and sediment behind. In this embodiment, silt-trapper **120** is constructed of circular couplers **20** joined together to form a linear barrier of sufficient length. It is understood other geometric shaped coupler fiber logs may also be used. Silt-trapper **120** is held between pairs of stakes **122** anchored into the sediment/soil or ground **123** and further held by ropes **124** which are wound between each pair of stakes over circular couplers **20**. Silt trapper **120** is formed by circular couplers **20** which are 12 inches in diameter. However, it is understood that the type of circular coupler fiber logs **20** required is determined by the application site environment. Anchor stakes **122** are typically placed in the front and in the back of silt-trapper **120** at user-prescribed distances, usually about 1 to 2 feet apart on each side of silt-trapper **120**. Stakes **122** preferably are made of hard wood, have about a 1.5 inches by 1.5 inches cross-section, are approximately 36 inches long, and are preferably notched at their upper ends to receive ropes **124**. Preferably, ropes **124** are made of nylon and are approximately 0.25 inch in diameter.

Sediment barriers may be constructed to various geometric configuration in addition to the linear silt-trapper **120** described above. FIG. **13** shows a ring silt-trapper **130** for the protection of a storm inlet **131**. Ring silt-trapper **130** is constructed with circular couplers **20** coupled together to form a ring of the prescribed diameter. Similar to linear silt-trapper **120**, ring silt-trapper **130** are held between pairs of wooden stakes **122** anchored to ground **123** and secured with ropes **124** wound over ring silt-trapper **130**.

The coupler fiber logs of the present invention may also be used on dry slope for slope stabilization. FIG. **14** shows a series of prairelog **140** installed on a 45° slope **143**. Prairelog **140** hinders the continuous slide of soil and sediments down such steep slopes, and hence reduces slope erosion. Prairelog **140** are typically placed across gradient of slope **143** in rows at user prescribed distances, usually about 3 feet apart.

Prairelog **140** is constructed of circular couplers **20**, either singly or joined, to form a linear barrier of sufficient length. While the use of circular couplers **20** is illustrated, it is understood other shaped coupler fiber logs, particularly triangular couplers **70**, may also be used. Prairelog **140** is held between pairs of stakes **142** anchored into slope **143** and further held by ropes **144** which are wound between each pair of stakes over prairelog **140**. Stakes **142** preferably are made of hard wood, have about 1 inch cross section, are approximately 24 inches long and are preferably notched at their upper ends to receive ropes **144**. Ropes **144** are preferably made of a strong, durable material, e.g. nylon, polypropylene. However, any other material may be used.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiments have been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed is:

1. A coupler fiber log comprising:

a filler pack having a first end and a second end;

a casing having a closed end and an open end, said casing extending about the outside of said filler pack, said closed end of said casing covering said first end of said filler pack;

a plug located inside said casing between the second end of said filler pack and the open end of said casing, said plug at least partially covering the second end of said filler pack; and

said casing having an extended section, said extended section axially extending between said plug and the open end of said casing.

2. The coupler fiber log of claim **1**, wherein said filler pack is cylindrical having an approximately circular cross section.

3. The coupler fiber log of claim **1**, wherein said filler pack forms an elongated log having an approximately rectangular cross section.

4. The coupler fiber log of claim **1**, wherein said filler pack form an elongated log having a triangular cross section.

5. The coupler fiber log of claim **1**, wherein said casing is porous.

6. The coupler fiber log of claim **1**, wherein said casing includes perforations.

7. The coupler fiber log of claim **1**, wherein said casing is a mesh netting.

8. The coupler fiber log of claim **7**, wherein said mesh netting is constructed from a group of materials consisting of polypropylene, polyethylene, jute, hemp, coir, sisal and mixtures thereof.

9. The coupler fiber log of claim **1**, wherein said plug is a ball of fibers surrounded by a net.

10. The coupler fiber log of claim **1**, wherein said plug includes a stem and a disk, wherein said stem extends into the second end of said filler pack.

11. The coupler fiber log of claim **1**, wherein said plug is a disk with an inside and outside face, said inside face is oriented toward said second end of said filler pack and said outside face is oriented toward said open end of said casing.

12. The coupler fiber log of claim **11**, wherein said plug is at least partially made of latex bonded fibers.

13. The coupler fiber log of claim **1**, wherein said filler pack is formed of coir fibers.

14. The coupler fiber log of claim **1**, wherein said coupler fiber log has a length and includes a plurality of plant wells spaced along said length of said coupler fiber log.

15. The coupler fiber log of claim **1**, wherein said casing includes a cinch cord woven around said open end of said casing and further comprises a plurality of s-hooks.

16. A modular erosion and sediment control barrier comprising:

first and second coupler fiber logs, said coupler fiber logs including a fiber pack having a first end and a second end, a casing having a closed end and an open end, said casing extending about the outside of said fiber pack, said closed end of said casing covering said first end of said fiber pack, a plug located inside said casing between the second end of said fiber pack and the open end of said tubular casing, said plug at least partially covering the second end of said fiber pack; and said casing having a net extension, said net extension axially extending between said plug and the open end of said casing; and

means for joining said first coupler fiber log to the end of said second coupler fiber log.

17. The modular erosion and sediment control barrier of claim **16**, wherein said means for joining includes means for securing said net extension of said first coupler fiber log to the closed end of said second coupler fiber log.

18. The modular erosion and sediment control barrier of claim **17**, wherein said means for securing includes a cinch cord woven around said open end of said casing and a plurality of s-hooks.

19. The modular erosion and sediment control barrier of claim **16**, wherein said fiber pack further includes a shaped cross section, wherein said shape is selected from the group consisting of a circle, a three-sided polygon, and a four-sided polygon.

20. The modular erosion and sediment control barrier of claim **16**, wherein said casing is a mesh netting.

21. The modular erosion and sediment control barrier of claim **20**, wherein said mesh netting is constructed from a group of materials consisting of polypropylene, polyethylene, jute, hemp, coir, sisal and mixtures thereof.

22. The modular erosion and sediment control barrier of claim **20**, wherein said plug is a ball of fibers surrounded by a net.

23. The modular erosion and sediment control barrier of claim **20**, wherein said plug is a disk with an inside and outside face, said inside face is oriented toward said second end of said fiber pack and said outside face is oriented toward said open end of said casing and wherein said plug is at least partially made of fiber infiltrated latex.

24. The modular erosion and sediment control barrier of claim **16**, wherein said coupler fiber log has a length and said coupler fiber log includes a plurality of plant wells spaced along the length of said fiber log.

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